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BANNER & WITCOFF

004/009

Response dated 12/09/2005
Response to Office Action mailed 09/09/2005

Application No. 10/044,405

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of claims:

Claims 1-4 (Canceled)

5. (Previously presented) A neural-stimulation method comprising:

measuring a strength-duration curve for neural excitation for at least one of a patient's neurons, the measuring of the strength-duration curve including measuring a plurality of stimulation-amplitude values at a corresponding plurality of stimulation-pulse durations and observing whether a desired clinical outcome is achieved, the desired clinical outcome including the reduction of tremor via thalamic stimulation;

providing neural stimulation having a plurality of stimulation parameters including a stimulation amplitude, a stimulation frequency, a stimulation pulse duration, an electrode-firing pattern, and a set of one or more electrode-polarity-firing conditions;

pseudo-randomly varying at least a first of the stimulation parameters; and

changing a value of a second of the stimulation parameters based upon having pseudo-randomly varied the first stimulation parameter and based upon a predetermined relationship that specifies how changes in the first parameter affect desirable values for the second parameter, the predetermined relationship substantially similar to the strength-duration curve for neural excitation.

6. (Currently amended) The neural-stimulation method of claim 5, further comprising:

varying the first stimulation parameter to produce a neuron-firing pattern, the neuron-firing pattern having a plurality of different interspike intervals measured either over an interspike-measurement duration or over a plurality of spikes;

7. (Previously presented) The neural-stimulation method of claim 6, wherein the neuron-firing pattern is selected from the group consisting of a substantially-normal-distribution neural-firing pattern, a skew-left-distribution neural-firing pattern, a skew-right-distribution neural-firing pattern, and a bimodal-bursting-distribution neural-firing pattern.

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8. (Currently amended) The neural-stimulation method of claim 61, wherein at least one of the one or more electrode-polarity-firing conditions is selected from the group consisting of: anode, cathode, and off.

9. (Currently amended) The neural-stimulation method of claim 81 wherein pseudo-randomly varying or changing the set of one or more electrode-polarity-firing conditions changes a spatial pattern of neurons affected by the neural stimulation.

10. (Currently amended) A deep brain The neural-stimulation method comprising: of claim 5 wherein the step of providing neural stimulation having a plurality of simulation parameters including a stimulation amplitude, a stimulation frequency, a stimulation pulse duration, an electrode-firing pattern, and a set of one or more electrode-polarity-firing conditions comprises:

providing deep brain neural-stimulation having a plurality of simulation parameters including a stimulation amplitude, a stimulation frequency, a stimulation pulse duration, an electrode-firing pattern, and a set of one or more electrode-polarity-firing conditions;

~~pseudo-randomly varying at least a first of the stimulation parameters; and changing a value of a second of the stimulation parameters based upon having pseudo-randomly varied the first stimulation parameter and based upon a predetermined relationship that specifies how changes in the first parameter affect desirable values for the second parameter.~~

Claims 11 (Canceled)

12. (Currently amended) The deep brain neural-stimulation method of claim 10 in which the step of varying at least a first of the stimulation parameters includes varying; at least a first of the stimulation parameters sufficiently to avoid development of physiological tolerance to the neural-stimulation.

Claims 13-23 (Canceled)

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24. (New) The neural-stimulation method of claim 5, wherein the step of pseudo-randomly varying at least a first of the stimulation parameters includes pseudo-randomly varying at least a first of the stimulation parameters within a predetermined range of values.

25. (New) The neural-stimulation method of claim 10 wherein the step of providing deep brain neural stimulation having a plurality of stimulation parameters including a stimulation amplitude, a stimulation frequency, a stimulation pulse duration, an electrode-firing pattern, and a set of one or more electrode-polarity-firing conditions includes providing stimulation of the thalamus.

26. (New) The neural-stimulation method of claim 10 wherein the step of providing stimulation of the thalamus includes providing stimulation of the thalamus to reduce tremor.

27. (New) The neural-stimulation method of claim 26, further comprising:
varying the first stimulation parameter to produce a neuron-firing pattern, the neuron-firing pattern having a plurality of different interspike intervals measured either over an interspike-measurement duration or over a plurality of spikes.

28. (New) The neural-stimulation method of claim 27, wherein the neuron-firing pattern is selected from the group consisting of: a substantially-normal-distribution neural-firing pattern, a skew-left-distribution neural-firing pattern, a skew-right-distribution neural-firing pattern, and a bimodal-bursting-distribution neural-firing pattern.

29. (New) The neural-stimulation method of claim 26, wherein at least one of the one or more electrode-polarity-firing conditions is selected from the group consisting of: anode, cathode, and off.

30. (New) The neural-stimulation method of claim 29, wherein pseudo-randomly varying or changing the set of one or more electrode-polarity-firing conditions changes a spatial pattern of neurons affected by the neural stimulation.

31. (New) The neural-stimulation method of claim 27, wherein the neuron-firing pattern is a substantially-normal-distribution neural-firing pattern.

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32. (New) The neural-stimulation method of claim 27, wherein the neuron-firing pattern is a skew-left-distribution neural-firing pattern.

33. (New) The neural-stimulation method of claim 27, wherein the neuron-firing pattern is a skew-right-distribution neural-firing pattern.

34. (New) The neural-stimulation method of claim 27, wherein the neuron-firing pattern is a bimodal-bursting-distribution neural-firing pattern.

35. (New) The neural-stimulation method of claim 26 in which the step of varying at least a first of the stimulation parameters includes varying at least a first of the stimulation parameters sufficiently to avoid development of physiological tolerance to the neural-stimulation.

36. (New) The neural-stimulation method of claim 5, wherein at least one of the one or more electrode-polarity-firing conditions is selected from the group consisting of: anode, cathode, and off.

37. (New) The neural-stimulation method of claim 5, wherein pseudo-randomly varying or changing the set of one or more electrode-polarity-firing conditions changes a spatial pattern of neurons affected by the neural stimulation.

38. (New) The neural-stimulation method of claim 5 in which the step of varying at least a first of the stimulation parameters includes varying at least a first of the stimulation parameters sufficiently to avoid development of physiological tolerance to the neural-stimulation.